WHAT IS CLAIMED IS:

1. An interconnect structure comprising:

at least one conducting metal feature formed atop a substrate;

at least one interlayer dielectric layer surrounding said at least one metal feature; and

a ceramic diffusion barrier, between said at least one interlayer dielectric layer and said at least one conducting metal feature, having a composition $Si_vN_wC_xO_yH_z$, where $0.1 \leq v \leq 0.9$, $0 \leq w \leq 0.5$, $0.01 \leq x \leq 0.9$, $0 \leq y \leq 0.7$, $0.01 \leq z \leq 0.8$ for $v + w + x + y + z=1$.

2. The interconnect structure of claim 1 wherein said ceramic diffusion barrier has a dielectric constant less than about 3.3.

3. The interconnect structure of claim 1 wherein said ceramic diffusion barrier further comprises a line level dielectric layer.

4. The interconnect structure of claim 1 wherein said ceramic diffusion barrier further comprises a line level dielectric layer and a via level dielectric layer.

5. The interconnect structure of claim 1 wherein said at least one interlayer dielectric layer further comprises a line level dielectric layer having a first composition and a via level dielectric layer having a second composition, where said first composition is different from said second composition.

6. The structure of claim 1 wherein said at least one interlayer dielectric layer has a composition comprising air or inert gas.

7. The interconnect structure of claim 1 wherein said at least one interlayer dielectric layer has a composition comprising $Si_vN_wC_xO_yH_z$, where $0.05 \leq v \leq 0.8$, $0 \leq w \leq 0.9$, $0.05 \leq x \leq 0.8$, $0 \leq y \leq 0.8$, $0.05 \leq z \leq 0.8$ for $v+w+x+y+z=1$.

8. The interconnect structure of claim 1, further comprising a lining metal containing barrier, where said lining metal containing barrier forms an interface between said at least one conductive metal feature and said at least one interlayer

dielectric layer, where said lining metal containing barrier comprises tantalum, tantalum nitride, tungsten, titanium, titanium nitride, ruthernium, TiSiN, or combinations thereof.

9. The interconnect structure of claim 4, wherein said at least one dielectric layer further comprises a dielectric etch stop layer positioned between said line level dielectric layer and said via level dielectric layer.

10. The interconnect structure of claim 1 wherein said ceramic diffusion barrier has a composition of $Si_{0.16}N_{0.17}C_{0.17}H_{0.5}$.

11. A method of forming a ceramic diffusion barrier layer comprising:
applying a coating of a polymeric preceramic precursor onto a semiconducting substrate, where said polymeric preceramic precursor has a composition of $Si_vN_wC_xO_yH_z$, where $0.1 \leq v \leq 0.8$, $0 \leq w \leq 0.8$, $0.05 \leq x \leq 0.8$, $0 \leq y \leq 0.3$, $0.05 \leq z \leq 0.8$, and $v+w+x+y+z=1$; and
converting said polymeric preceramic precursor into a ceramic diffusion barrier layer, where said ceramic diffusion barrier prohibits metal diffusion.

12. The method of claim 11, wherein said polymeric preceramic precursor comprises polysilazanes, polycarbosilanes, polysilasilazanes, polysilanes, polysilacarbosilanes, polysiloxazanes, polycarbosilazanes, polysilylcarbodiimides, or polysilacarbosilazanes.

13. The method of claim 11, where said applying a coating of said polymeric preceramic precursor comprises preparing a solution of said polymeric preceramic precursor and a solvent; and then applying said solution by a solvent based process.

14. The method of claim 13, wherein said solvent based process comprises spin coating, spray coating, scan coating, dip coating, or combinations thereof.

15. The method of claim 13 where said solution further comprises:
an adhesion promoter codissolved in said solvent containing said polymeric preceramic precursor, where said adhesion promoter has a composition of $Si_xL_yR_z$, where L is selected from the group consisting of hydroxy, methoxy, ethoxy, acetoxy, alkoxy, carboxy, amines or halogens, and R is selected from the group consisting of hydrido, methyl, ethyl, vinyl, and phenyl.

16. The method of claim 13, wherein said solvent comprises propylene glycol methyl ether acetate (PGMEA), propylene glycol methyl ether (PGME), toluene, xylenes, anisole, mesitylene, butyrolactone, cyclohexanone, hexanones, ethyl lactate, heptanones or combinations thereof.

17. The method of claim 11, wherein said conversion of said polymeric preceramic precursor into said ceramic diffusion barrier layer comprises thermal curing, electron irradiation, ion irradiation, irradiation with ultraviolet light, irradiation with visible light, or combinations thereof.

18. The method of claim 13, wherein a sacrificial moiety to produce porosity is codissolved in said solution including said polymeric preceramic precursor, where said sacrificial moiety is a sacrificial polymeric selected from the group consisting of poly(stryenes), poly(esters), poly(methacrylates), poly(acrylates), poly(glycols), poly(amides), and poly(norbornenes).

19. The method of claim 13, wherein an antistriation agent is codissolved in said solution containing said polymeric preceramic precursor.

20. The method of claim 11, wherein said semiconducting substrate comprises at least one metal region and at least one dielectric region, where said ceramic diffusion barrier is positioned between said at least one metal region and said at least one dielectric region.